

## Interannual Mass Transport: Signatures in Temporal Variations of the Geopotential

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The Earth is a dynamic system with a fluid, mobile atmosphere and oceans, a continually changing distribution of ice, snow, and groundwater, a fluid core undergoing hydromagnetic motion, a mantle undergoing both thermal convection and rebound from glacial loading of the last ice age, and mobile tectonic plates. These processes affect the distribution of mass in the Earth and produce variations in the Earth's gravitational field on a variety of spatial and temporal scales. Highly accurate measurements of the Earth's gravity field made with appropriate spatial and temporal sampling can thus be used to better understand the processes that move mass within the Earth, and on and above its surface.

Temporal variations of the combination of the even zonal geopotential harmonics are investigated using the monthly (or 12 day arc) solutions of the geodetic satellite Lageos I from 1980 to 1998. Although geopotential variations exhibit robust seasonal variations, we focus on its interannual variability by removing the composite seasonal cycle. Gravity variations induced by atmospheric mass and groundwater are estimated and compared to the geodetic determination, exploring their connection with El Nino/Southern Oscillation phenomenon (ENSO). Results are dependent on the indices used; their implications regarding the mechanisms responsible for interannual mass transports in the Earth System will be discussed.